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A.D. 1892. Oct. 20. Nº 18,814.

HUGHES—HALLET'S COMPLETE SPECIFICATION.

Fig 1

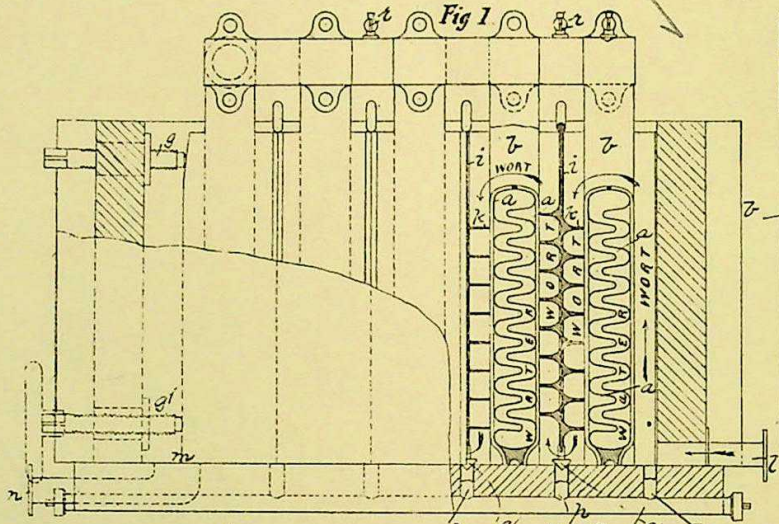


Fig 2.

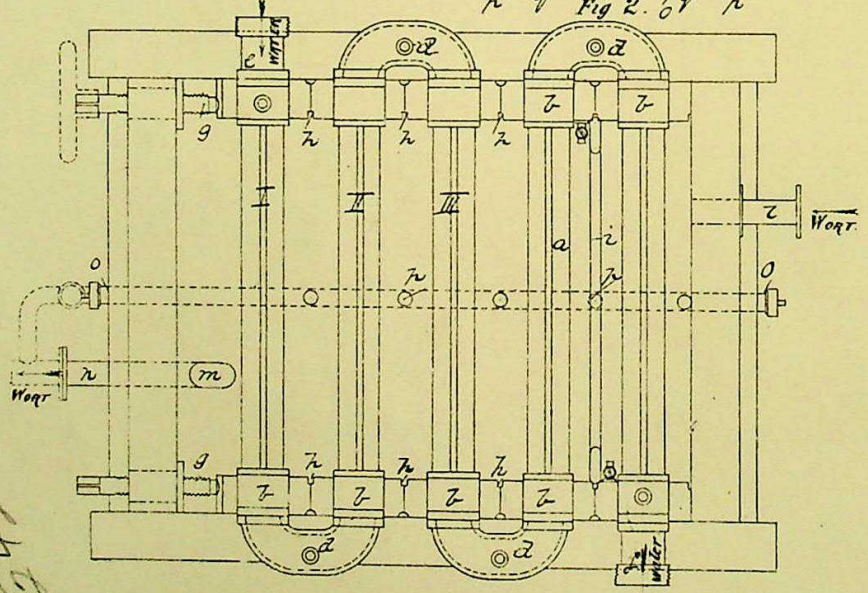


Fig 3

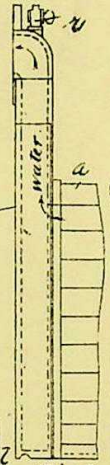


Fig 4

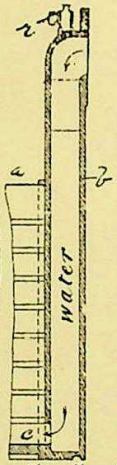


Fig 5

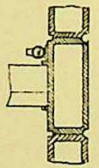


Fig 6.

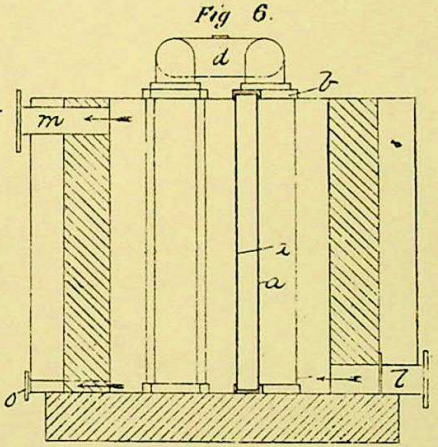
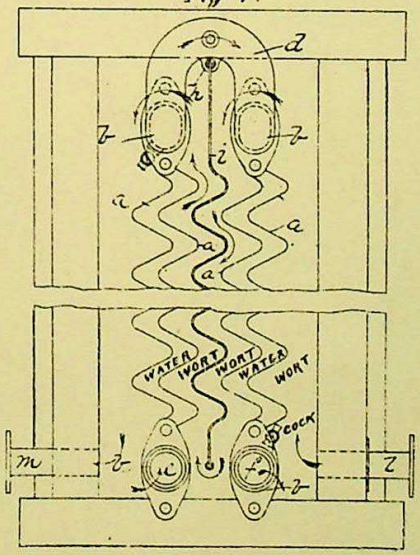


Fig 7.



Beer Cooling
DUPLICATE.
92. REFRIGERATION,

N° 18,814 A.D. 1892

Date of Application, 20th Oct., 1892
Complete Specification Left, 20th July, 1893—Accepted, 20th Oct., 1893

PROVISIONAL SPECIFICATION.

An Improved Refrigerator or Heater for Cooling or Heating Wort or other Liquid.

I, CHARLES FREDERICK HUGHES-HALLETT, of 41 St. Stephen's Avenue, Shepherd's Bush, in the County of Middlesex, Civil Engineer, do hereby declare the nature of this invention to be as follows :—

This improved refrigerator is made as follows : A vertical refrigerator, or heater is made in or of a number of sections similar to the "Lawrence" refrigerators made of corrugated plates, either placed as in the said Lawrence refrigerator, or back to back, so as to present a tubular appearance inside or consisting of tubes. These sections are placed parallel to each other at a suitable distance apart and between each two sections a deflecting diaphragm with baffle plates or projections is placed, which may be solid or also corrugated and hollow, or tubular, so as to cause the wort to impinge against the whole of the corrugations &c., and thus get more cooling or heating surface in a given area than by flat tubes placed edge to edge.

The sections are interchangeable and removable for cleaning purposes and connected together by flanged D-shape or other bends, the joints of which are above the level of the wort or liquid treated. The ends of the sections can be made removable when required so that the interior can be cleaned.

The whole is enclosed in a "wood back" lined with copper, or made of brass or gun-metal, and in addition to the wort or liquid inlet and outlet proper, a small draining pipe is connected to and with each pair of sections. The corrugations &c. can be placed so as to run vertically or horizontally as required, but the latter is probably the best form ; each corrugation may be drained separately. The liquor to be treated flows over or about each section in succession until it issues from the apparatus.

The advantage consists in obtaining a larger surface in a given area which is usefully obtained by means of the diaphragms which cause the liquor to be treated to impinge on the whole of the corrugated surface.

Dated this 20th day of October 1892.

HERBERT & Co.,
Agents to Applicant.

COMPLETE SPECIFICATION.

An Improved Refrigerator or Heater for Cooling or Heating Wort or other Liquid.

I, CHARLES FREDERICK HUGHES-HALLETT, of 41 St. Stephen's Avenue, Shepherd's Bush, in the County of Middlesex, Civil Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement :—

This improved refrigerator or heater is made as follows :

A vertical refrigerator, or heater is made in or of a number of sections, similar to the Lawrence refrigerators made of corrugated plates, or back to back, so as to present a tubular appearance inside or consisting of tubes. These sections are placed parallel to each other at a suitable distance apart and between each two sections a deflecting diaphragm with baffle plates or projections is placed, which may be solid or also corrugated and hollow, or tubular so as to cause the wort to impinge against the whole of the corrugations of the refrigerating or heating plates, and thus get more cooling or heating surface in a given area than by flat tubes

placed edge to edge. The sections are interchangeable and removable for cleaning purposes, and connected together by flanged D shape or other bends, the joints of which are preferably above the level of the wort or liquid treated. The ends of the sections can be made removable when required, so that the interior can be cleaned. The whole is enclosed in a "wood back" lined with copper, or made of metal, and in addition to the wort or liquid inlet and outlet proper, a small draining pipe is connected to the space between each pair of sections. This draining pipe may also be one and the same with the usual outlet pipe. The plates may be placed so that the corrugations run at any angle or vertically or horizontally as required, but the latter is probably the best form, and the spaces within the plates of each refrigerating or heating section may be drained separately.

The liquor to be treated flows over or about each section in succession until it issues from the apparatus.

The advantage consists in obtaining a larger surface in a conveniently shaped space and is usefully obtained by means of the diaphragms which cause the liquor to be treated to impinge on the whole of the corrugated surface.

In the annexed drawing

Fig. 1 is a side elevation partly in section of a form of machine made according to this invention with the corrugations of the walls of the refrigerating or heating chambers arranged horizontally.

Fig. 2 is a plan view thereof.

Fig. 3 is an elevation of part of the end of one of the said chambers.

Fig. 4 is a section through the same.

Fig. 5 is a horizontal section through the same showing parts of the ends of the two adjacent chambers.

Fig. 6 is a sectional elevation and Fig. 7 a plan of a machine in which the corrugations run vertically.

Referring to Figs. 1 to 5 each operative section or chamber in which the fluid for effecting the heating or cooling passes, is composed of a corrugated plate or plates *a a* fixed at their ends to and carried by two end frames *b b* which are hollow and preferably broader than the breadth of the corrugated chamber formed by the plates *a* as will be more clearly seen in Fig. 5 so that each section may touch the next on either side and enclose a space between the sectional interior of the said end frames for passage of the wort or liquid to be treated. At or near the base of one end of frame or chamber *b* is a passage way *c* for the heating or cooling operative liquid to pass into the space within the corrugated plates *a*, and at or near the upper end of the end frame or chamber *b* which is at the other end of the plate *a* is a similar passage way for outlet of the heating or cooling liquid from said space.

It will thus be obvious that the said liquid or operative fluid of whatever nature in passing from the one end chamber to the other traverses the space within the corrugated plates *a* in a direction transverse to the corrugations. The two end chambers of each section are connected respectively at their upper ends to the adjacent end chambers of the two next sections, the one to that on the one side the other to that on the other side, by means of the D or equivalent shaped pipes *d d* Fig. 2. The first section and the last section however are provided with inlet *e* and outlet *f* respectively from one of their end chambers. It will be clear therefore that the operative fluid entering at *e*, Fig. 2, traverses the interior of the first section I passes to the next section II and traverses the latter in the contrary direction passes thence to the third section III and thus through all the sections successively until it issues at the outlet *f* Fig. 2.

The tank or back in which these sections are placed may be of the form and construction shown in Figs. 1 and 2. The lateral extension of each end chamber *b* forms an abutment for the next and secures the space between the sections when they are firmly pressed together by the screws *g* and g^1.

At the meeting edges of the end chambers *b b*, is cut a slot *h* down the edge, which lies towards the interior of the back. This slot forms a groove into which

the end of the diaphragm plates *i* may be slid, or they may be otherwise secured. These diaphragms stand vertically in the spaces between the sections and divide each space into two. They are corrugated or provided with projecting baffle plates *k* extending from each face towards the corrugations in the plates *a*. These diaphragms, which are easily removable by lifting out, rest so as to leave a free passage way under their lower edges.

The wort or liquid to be treated enters at *l* and passes upward over the summit of the nearest section, then descends between that section and the near side of the diaphragm, ascends on the other side of said diaphragm in contact with the next section, passes over the latter and so on till it reaches the outlet *m* where it is carried off by pipe *n*.

For draining the spaces between the sections the pipe *o* is provided with branches *p* to each said space. This pipe may be omitted and pipe *n* made to serve the purpose. A valve *q* may be used to close each branch and is removable after the diaphragms have been lifted. For this purpose the valve may be attached to the diaphragms. *r* are air cocks.

In the construction shown in Figs. 6 and 7 the wort or liquid to be treated flows horizontally back and forth around the sections, the latter must therefore be so fixed as to leave passage way for the said liquid at the edges of the vessel at any rate along one side. The diaphragm has its corrugations or baffle plates arranged vertically and the corrugations of the plates *a* are similarly arranged. The diaphragm fits into a groove at that side of the back which the sections do not touch, while at the other end the passage way is left.

The passage of the liquid to be treated and the operating fluid will be apparent from the arrows in the drawing and the equivalent lettering of the parts with those fulfilling the same functions in Figs. 1 to 5. The apparatus as shown in Figs. 1, 3, 4 and 6 is conveniently placed at an angle as shown to give a fall to the liquid treated.

I do not confine myself to any particular number of sections.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is :—

1. In a refrigerator or heater for wort or other liquid the combination of a series of parallel vertical sections spaced from each other by the lateral extension of the end chambers thereof and having in said spaces diaphragms with corrugations or baffle plates, arranged so that the liquid to be treated and the heating or cooling liquid pursue courses substantially as hereinbefore described.

2. In a refrigerator or heater for wort or other liquid the combination of a series of sections consisting of plates *a*, end chambers *b b*, connecting pipes *d*, diaphragms between said chambers and a containing back ; the plates *a* being corrugated horizontally, vertically or at any convenient angle, the diaphragms provided with equivalently arranged corrugations or baffle plates and fitted to leave a passage way for the liquid to be treated, and the attemperating sections arranged to permit passage of said liquid over or alongside of them so that the latter liquid pursues a course in relation to the diaphragms and attemperating sections substantially as set forth.

Dated this 20th day of July 1893.

HERBERT & Co.,
18, Buckingham Street, Strand, London, W.C., Agents to Applicant.

London : Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1893